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United States Department of Agriculture, FOREST SERVICE.

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SILVICAL LEAFLET 22.

AMABILIS FIR.

Abies amabilis (Loud.) Forb.

Amabilis fir is abundant in the mountains of Washington and Oregon, but, because of its soft, perishable wood, it is not commercially important at the present time. It is a large tree, with good clear length, and will probably form an important part of our future lumber supply. It is also valuable as a component of the protection forests at the headwaters of streams, and is silviculturally important in the dense lowland forests because of its tolerance and ability to form an understory beneath the shade of other species.

RANGE AND OCCURRENCE.

Amabilis fir ranges through the Cascade and Coast Range mountains from Boca de Quatre Inlet, at the extreme southeastern end of Alaska, through British Columbia, Washington, and Oregon to Saddle Mountain, 25 miles south of the mouth of the Columbia River, in the Coast Range, and to Old Bailey Mountain, northwest of Crater Lake, in the Cascade Mountains. It has not been reported, however, in British Columbia between the northern end of Vancouver and Alaska.

In altitude the tree ranges from sea level to 1,000 feet in Alaska; from sea level to 4,500 or 5,000 feet in Vancouver and the Olympic Mountains, although it is absent from the lower elevations around Puget Sound; from 500 to 6,000 feet above sea level in the Cascade Mountains of northern Washington; and from 3,000 to 6,000 feet in the southern part of its range in the Cascade Mountains of Oregon.

It shows some preference for northern exposures, and in the Cascades it is more abundant and reaches lower altitudes on western than eastern slopes. The best development is attained on well-drained slopes and benches in the Olympic Mountains of Washington.

CLIMATE.

The geographical and the altitudinal distribution of amabilis fir gives it an equable climate with abundant precipitation, moderate humidity, long vegetative season, and small seasonal and daily ranges of temper-

ature. The annual precipitation averages about 45 inches, with a snowfall of about 2 feet, which does not long remain on the ground. Through the greater part of its range the temperature does not fall below zero nor rise above 90° F.

ASSOCIATED SPECIES.

Amabilis fir occasionally forms pure stands over small areas, but more commonly grows in mixture with other species. It occurs pure in isolated groups in the forest of Vancouver Island, and also in open park forests at high elevations in the Cascade Mountains. On the mainland of British Columbia it grows above the Douglas fir forest in mixture with western and black hemlocks, and western white and white-bark pines. In Washington and Oregon its common associates at low elevations are western hemlock, noble and lowland firs, giant arborvitæ, and Douglas fir; at moderate elevations, lodgepole and western white pines and yellow cedar; and near its upper limit, black hemlock, alpine fir, Engelmann spruce, and white-bark pine.

HABIT.

In favorable situations amabilis fir is a large tree. At maturity it reaches a diameter of from 4 to 6 feet and a maximum height of 250 feet. It has a large, straight, cylindrical bole, sometimes clear of limbs for 100 feet or more. The tree is usually not clear for more than one-third of its height, however, because the branches are persistent. In good stands it will average from 2 to 4 feet in diameter and 160 feet in height. At higher altitudes on steep mountain slopes and at its northern limit in Alaska it is a small tree, with limbs nearly or quite to the ground. The crown of the tree is a long, spire-like pyramid. The short branches, clothed with long, pendulous branchlets, sweep down in graceful curves.

The bark on trees for the first 150 years is thin, smooth, and silver-white, but in later life it is from 1½ to 2½ inches thick and becomes reddish-gray and broken.

The root system is shallow and restricted. The roots are seldom over 2 feet deep and rarely spread farther than 10 or 20 feet from the trunk, but they are closely matted and bind the soil and rock together in great masses. Because of its shallow roots the tree is easily killed by ground fires in the deep leaf mold.

SOIL AND MOISTURE.

In its soil requirements amabilis fir is exacting, especially as regards drainage. It grows, however, on a variety of soils, from shallow, gravelly sand to moist, well-drained, sandy loam, but shows by its better development a preference for the latter type. Abundant soil moisture with good drainage appears to be essential for its best growth.

TOLERANCE.

Among the trees with which it associates, *amabilis* fir is more tolerant than Douglas fir, western white pine, noble fir, lowland fir, and western larch, and less tolerant than Pacific yew, giant arborvitæ, yellow cedar, and western hemlock. It closely resembles noble and lowland firs and Engelmann spruce in its ability to endure shade. The seedlings do best when moderately shaded. After the seedling stage it can endure shade, although it grows slowly under such conditions.

GROWTH AND LONGEVITY.

Amabilis fir is a fairly rapid-growing tree. Of the species with which it commonly occurs, it is slower in growth than Douglas fir, Sitka spruce, western white pine, or noble fir, but faster than lowland fir, giant arborvitæ, western hemlock, Engelmann spruce, or alpine fir. It makes its most rapid growth in the first 150 years, but usually remains sound and merchantable up to 350 years.

REPRODUCTION.

Amabilis fir is a prolific seed producer, and its reproduction is usually abundant throughout its range. Germination will take place in moss or duff.

